

Ethnographic and Archaeological Aspects of a Flaked Stone Collection from Seram, Eastern Indonesia

Received 30 July 1974

IAN C. GLOVER AND ROY F. ELLEN

IT IS ironic that a naturalist, G. E. Rumphius (1628–1702), first described prehistoric tools in Indonesia. Rumphius, who lived and worked on Ambon in the central Moluccas (see Heine-Geldern 1945: 129), devoted a chapter in his *D'Amboinische rariteitskamer* (1741: 207–217) to the description of stone implements. Van Heekeren (1972: 163, 169) gives references to other polished stone implements found on Seram and Ambon-Lease.

During recent fieldwork among the Nuaulu, a hunting, collecting, and swiddening community of south central Seram in the central Moluccas, one of the authors obtained a small collection of chert flakes and other pieces. These specimens are now dispersed among three museums (Table 1). The collection was assembled primarily as part of a systematic investigation of Nuaulu material culture, the specimens representing an actual or potential part of the equipment used to produce fire by percussion. Examination shows that many are struck flakes, a few of which have secondary working, while some appear to have been used other than as strike-a-lights. The Nuaulu do not flake stone at the present time, and there are not historic or ethnographic descriptions of stone-flaking for this area. We believe, therefore, that we are justified in regarding this material as prehistoric in a rather general sense, without attributing a specific antiquity to it. Moreover, these are, as far as we are aware, the first non-polished stone artifacts to be recovered from anywhere in the Moluccas, and for this reason alone they seemed to be of sufficient interest to warrant careful, detailed description and publication.

Despite the fact that the collection is both small (containing few worked or utilized

Jan C. Glover is affiliated with the Institute of Archaeology, London, and Roy F. Ellen with the University of Kent at Canterbury.

TABLE 1. LOCATION OF SPECIMENS

PERIOD COLLECTED	LOCATION	FIELD CATALOGUE NUMBERS*	QUANTITY
April-July 1970 and January 1971	Rijksmuseum voor Volkenkunde, Leiden	<i>82, 159, 175, 221, 244</i>	5
"	Museum of Mankind, London	<i>124</i>	1
"	Lembaga Purbakala dan Peninggalan Nasional, Jakarta	<i>145-158, 160-174, 179-187, 189-191, 202, 206-207, 211-214, 219-220, 350, 407</i>	52
August 1973	Lembaga Purbakala dan Peninggalan Nasional, Jakarta	<i>661-687, 692, 694-757, 760-762, 764</i>	95
Total			153

* Throughout the text specimen numbers are given in italics.

pieces) and unstratified, it does suggest that further research in the area would produce good evidence of a local stone-flaking tradition. Since the central Moluccas are midway between the flaked stone traditions already quite well known in western, central, and southeastern Indonesia and the Philippines (Glover 1973) and those emerging in Papua (Allen 1972), the area is of interest to archaeologists working in this field. What makes this particular series of further interest, however, is that some of the pieces have been used at the present time for a purpose for which they were probably not originally intended, namely, the production of fire. This usage raises a number of issues which we think merit some attention, involving the evaluation of the collection in both its ethnographic and archaeological contexts, and the relationship between the two.

Present-day Nuaulu stone technology is much more limited than it must have been before the introduction of metal on a significant scale during the Dutch colonial period. Locally-forged mild steel is now used for most of the key hunting and processing tools in the Nuaulu technical inventory—bush-knives, domestic knives, and spearheads. Bamboo, however, remains an important material for related functions. Stone is still utilized systematically for a whole range of items: for the manufacture of barkcloth beaters; for mortars, pestles, and hammerstones used in the preparation of food, betel nuts, paints, dyes, and medicines; in the manufacture of tools and other artifacts, and in building construction; as an abrasive for cleansing and cosmetic purposes (particularly pumice stone); as anvils in various manufacturing processes, and as both portable and sessile whetstones. In addition, during the recent historic past—probably at least up to the end of the last century—quartz appears to have been used for the working edge of adzes or pounders employed in the extraction of sago pith (see Wallace 1962 [1869]: 290). But it is only in the form of strike-a-lights that siliceous material is used now in any quantity.

The Nuaulu still predominantly use stone and steel as a fire-producing device, although cheap trade lighters have appeared as luxury items in the last decade or so. Matches are known to them, but are seldom if ever used. The steel which is used (*kitupane*) is commonly derived from old knife blades, cartridge clips, or other metal scraps, while the tinder (*panua*) is scraped from the bark of certain palms,

particularly the aren (*Arenga pinnata* (Wurmb.) Merr.). The steel piece is struck against the flake (*kinonote*), which is held between the thumb and the forefinger of the other hand together with the tinder. Once sparks have kindled the tinder, the heat is transferred to a firelighter (*sakate*) of aren-palm fiber and rattan, which may then be kept smouldering for an indefinite period.

Although the Nuaulu have had access to forged steel for this purpose for many centuries (the more efficient hard steels have only been introduced relatively recently), clearly there must have been a period when some alternative method was employed. It is possible that fire was produced simply by the striking together of two chert flakes; however, dissimilar pairs of materials are much more effective. More likely is a combination of iron pyrites and chert, a technique used extensively elsewhere, although the sparks produced are not so hot as those from steel and chert (for example, see Harrison [1954: 218–219]). There is no evidence that either two pieces of iron pyrites (see, for example, Craig 1967) or pyrites and chert were used in Seram to produce fire. Pyrites, however, does occur and there is no reason why it should not have been used formerly in the ways described. There is also no evidence that we know of to suggest that bamboo and porcelain were used to make fire by percussion, although this practice is known from other widely separated parts of Mainland and Island Southeast Asia (e.g., Held 1957: 360–361).

The term *kinonote* specifically denotes those chert pieces used in fire-making. Unutilized but similar stones would not normally be referred to as such. All chert, obsidian, flint, and related material comes within the Nuaulu mineral category *hatu tinar*, 'thunderstone', whose principal distinguishing characteristic is that it is easily fractured and can be flaked. Thus, all *hatu tinar* are potentially, at least, *kinonote*; but not all *kinonote* are *hatu tinar*—for instance, *k. botoni* and *k. putie* fall outside this category. *Hatu tinar* is one of about eleven primary mineral and rock categories recognized by the Nuaulu (*hatu* = rock, stone, mineral). The name, as might be expected, refers to their assumed origin, for they are believed to have fallen from the sky during thunderstorms. (Rumphius apparently accepted without question similar local explanations as to their origin. Perhaps this is not so surprising when we remember that his contemporaries, such as the zoologist Ulisses Aldrovandi, were giving extraterrestrial explanations for the stone tools of Europe [Daniel 1962: 38–39].) Sacred properties are attributed to extensive outcrops of *hatu tinar* in the high valleys of the interior, in the headwaters of the rivers Nua and Ruatan, and some large boulders are believed to have killed men as they fell. Further information on the Nuaulu classification of minerals and its cultural significance has been compiled by Ellen (1973: 237–238, 440–441).

The Nuaulu divide *kinonote* into at least five terminologically distinct types (Table 2), of which *k. warata* is the most common. Other varieties comprise less than 4% of this collection. Strike-a-lights from glass (*k. botoni*) are rarely used, perhaps because glass, 1.5 points lower than chert on the Mohs scale, is insufficiently hard.

In Table 3 we distinguish between flakes and cores, on the one hand, and naturally broken (or at least not purposefully flaked) pieces, on the other hand. The Nuaulu make no such differentiation, but it is remarkable that very few of the apparently naturally broken pieces of chert in this collection seem to have been used as strike-a-lights, or for any other purpose. In the field most specimens were

TABLE 2. NUAULU CLASSIFICATION OF THE CATEGORY 'KINONOTE'

TYPE	NUAULU TERM	ENGLISH GLOSS	DESCRIPTION	NUMBER IN SAMPLE
I	<i>k. warata</i>	'Dutch/European' strike-a-light	Brown, pinkish red to cream colored chert	147
II	<i>k. botoni</i>	'bottle' strike-a-light	Flake from clear weathered bottle glass	1
III	<i>k. metene</i>	'dark/black' strike-a-light	Dark colored chert	1
IV	<i>k. buane nehene</i>	'glittering liver' strike-a-light	Awkward literal translation, but presumably refers to the blood-red color of the chert pieces	3
V	<i>k. putie</i>	'white' strike-a-light	Flake from quartzite pebble or vein quartz, sometimes ironstained	1
Total				153

TABLE 3. TYPOLOGICAL CLASSIFICATION OF FLAKED STONE COLLECTION FROM RUHUWA, SOUTH SERAM

GROUP	DESCRIPTION	QUANTITY
<i>Artifacts</i>		
1	Cores and broken cores with one or more striking platforms	9
2	'Burins' (one on a core)	2
3	Blades with no signs of use or modification	1
4	Retouched flakes	3
5	Flakes or blades with edge utilization	28
6	Flakes or blades with bifacial, lateral edge-battering	11
7	Small flakes, mainly broken, with bifacial battering at one end	6
8	Flakes with bifacial battering around entire margin	2
9	Flakes with no signs of use or modification	28
<i>Probably naturally broken pieces</i>		
10	Lumps with bifacial battering at one end	9
11	Lumps or pseudo-cores	12
12	Pseudo-flakes, or small broken pieces with no signs of use or edge modification	35
13	Broken glass	1
Total		147

collected by Nuaulu informants with the express purpose of giving them to Ellen. They came from in and around Ruhuwa, a coastal village about 30 km east of the district administration post of Amahai (128°52'42" E, 3°21'27" S). Some pieces were recovered by Ellen, and a few, which have a known history of regular use as strike-a-lights, were also obtained from informants. At Ruhuwa, chert is present in the banks and bed of a small watercourse which passes through the center of the

village into the Banda Sea. In its lower course, the stream flows only during periods of heavy rain, normally from May to August. At other times the bed is usually dry and the chert can readily be found. Those specimens known to have been used have more diverse origins, most coming from nearby coastal alluvial areas, but at least one (762) was obtained much farther afield, in Rumah Olat, a village on Teluk Seleman in north Seram. The pieces of archaeological interest are all chert, colored cream, brown, pinkish red, and dark blood red; simply judging from its appearance, the material would seem to be derived from small river or beach pebbles, with some degree of surface patination and only occasionally a little cortication.

Geologically, the Nuauulu area straddles a phyllite formation and coastal Quaternary alluvium. The latter contains crystalline schists (largely muscovite and fine-grained biotite) and quartzose sandstones, but most prominent are the Neogene coralline deposits of soft, white, porous limestone, too recent to contain chert (see Gemeraad 1946: 20-22, 34). The raw material for these flakes seems to have come from outside the immediate vicinity. Since some of the Mesozoic formations of the interior are known to be chert-bearing, it may have been brought down to the coast by larger rivers such as the Nua and Ruatan that drain the highlands. But the short stream at Ruhuwa and other small rivers along the south coast do not pass through these older formations, and the chert, which occurs in its banks and bed as small lumps and flakes, may all have been brought down from the interior by man sometime in the past, and worked in the village. The Nuauulu both know and visit the inland areas at the present time, although for other purposes. These areas were their traditional homelands (Ellen 1973: 33, map 3) before the phase of settlement starting during the last century which brought them to the coast.

Out of the total collection of 153 pieces, 147 have been examined (those now at the Lembaga Purbakala dan Peninggalan Nasional) and are described below. At least 55% of these are struck flakes, 12% are either worked cores or small broken pieces of chert worked by man, and 33% are probably naturally broken pieces with no signs of use. Although naturally occurring rounded nodules and pebbles may not have been sought by the Nuauulu as strike-a-lights, the high proportion of struck and used flakes in this collection lends some support to the idea that these pieces were not obtained from an ordinary river gravel, but came from an older occupational or at least industrial site.

There are three blades of which at least one (Fig. 1, 191) suggests that a true blade technology with prepared cores was known in Seram in the past. However, examination of both the few cores and all the other flakes indicates more simple flaking techniques. Only three flakes, of which two are broken, show any signs of secondary working, so the collection cannot be compared in detail with the industries now becoming known elsewhere in Indonesia, the Philippines, and New Guinea. But the flaking technique and the size range of the flakes are in general accordance with industries from the post-Pleistocene cave deposits to the west. No pieces show signs of extensive rolling or abrasion, and most edges are sharp, although many have irregularly distributed small fractures suggesting that the collection has suffered a fair degree of disturbance or trampling quite apart from the use of some as strike-a-lights in recent times. However, the surface condition of the pieces argues strongly against very long (i.e., thousands of years) exposure. Seventeen of the pieces have thermal, pot-lid fractures on one or more surfaces. All but four of these are,

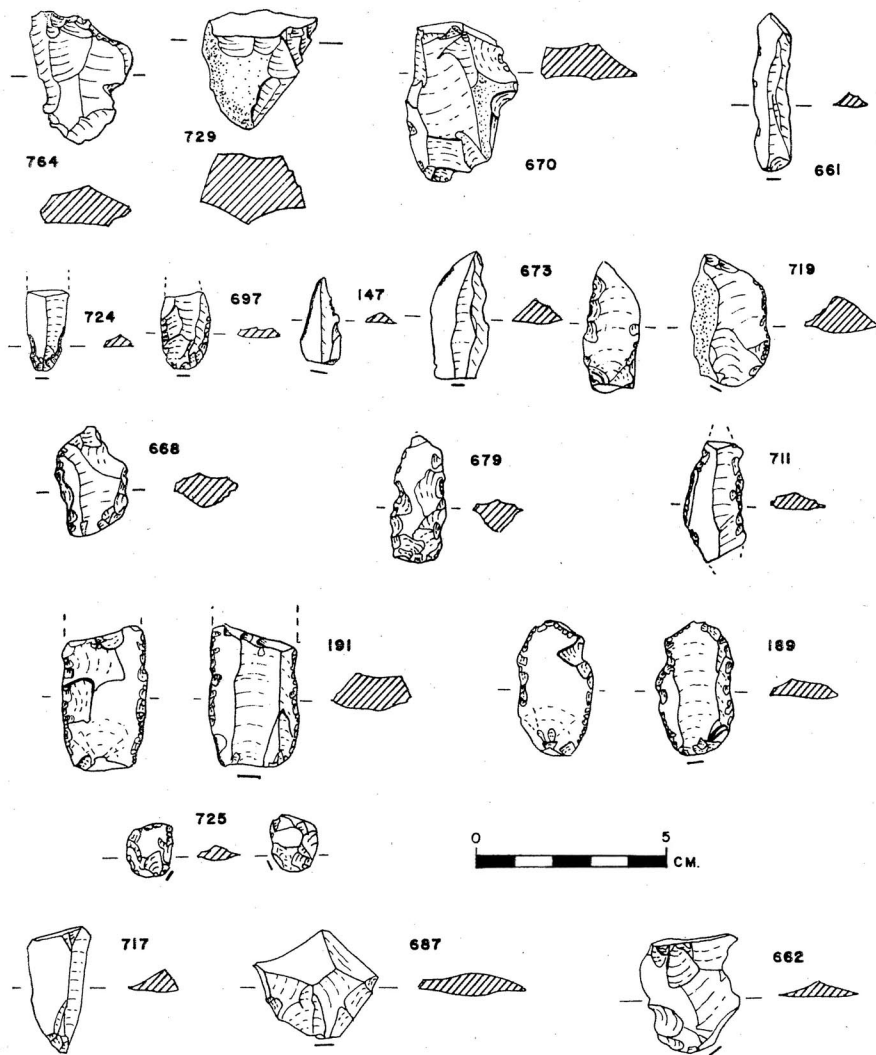


Fig. 1 Flaked stone tools from Ruhuwa, Seram. Group 1: 764, 729; Group 2: 670; Group 3: 661; Group 4: 724, 697, 147; Group 5: 673, 719; Group 6: 668, 679, 711, 191, 189; Group 8: 725; Group 9: 717, 687, 662.

however, in categories 11 and 12, although this is not the criterion used to identify the latter as products of largely natural processes of manufacture.

Some small differences can be seen between the pieces collected in 1970–1971 and those recovered in 1973, although the two collections come from approximately the same range of sources. The smaller, earlier, collection contained proportionately more struck flakes, more flakes with fine edge utilization, but fewer cores and naturally broken pieces. In other respects the material in the two collections is very similar. When the collection was analyzed Glover did not know which pieces had, in fact, been used by the Nuaulu to produce fire. He regarded only those in group 6 (Table 3) as probable strike-a-lights, relying on his observations on fire-making

materials in Timor; but it is clear from data collected by Ellen that very small pieces of chert may be used in Seram and that some of the pieces in groups 1, 7, 8 and 10 may also have been used, albeit briefly, in this way.

1. CORES (Fig. 1, 729, 764)

Only five out of the nine identified cores look reasonably complete, ranging in size from $34 \times 23 \times 22$ mm to $32 \times 27 \times 10$ mm. All have two or more platforms at irregular angles to each other and exhibit no signs of regular core preparation for blades or other predetermined flake types. Two of the strike-a-lights (674, 679) obtained by Ellen directly from Nuaulu informants are reused cores.

2. BURINS

Both 'burins' are so classified in a technical sense only, and may not have been intended. One, a dihedral type (Fig. 1, 670), has also served as a core, and the single burin angle of 85° is formed by the intersection of two narrow flake scars. The second piece has one flake removed down each margin from a break.

3. BLADES WITH NO SIGNS OF USE OR MODIFICATION (Fig. 1, 661)

There is one long, narrow blade (41×10 mm) with a double, converging, median ridge and a plain striking platform 4×2 mm. Both margins are thin, with small, irregularly distributed scars, perhaps accidental. There are also two broader blades (Fig. 1, 189 and 191) which have been used as strike-a-lights. 191 is broken, but clearly indicates true blade production.

4. RETOUCHE FLAKES (Fig. 1, 147, 697, 724)

Two of the retouched pieces (697, 724) are both small flakes or perhaps flakes/blades similar in shape and proportion to 661 but snapped, and with fine, rather abrupt, secondary flaking from the bulbar face on both margins and diminishing away from the butt. 147 is a small pointed flake with very fine retouch on one margin from the tip toward the butt. Although none of these are true blunted-back blade-lets, they would not be out of place in an assemblage of backed tools.

5. UTILIZED FLAKES OR BLADES (Fig. 1, 673, 719)

Twenty-eight flakes have concentrations of fine scars on one face only on quite sharp margins, which suggest that they were unmodified and briefly used as cutting or scraping tools. It seems unlikely that this pattern of wear could come from use as strike-a-lights.

6. FLAKES WITH BIFACIALLY BATTERED MARGINS (Fig. 1, 189, 191, 668, 679, 712)

In contrast with group 5, there are eleven flakes with quite heavy bifacial battering, leading to small step flakes along the lateral margins. This is almost certainly

due to their having been used as strike-a-lights. Similar edge fracturing on flints from such a use has been observed by Glover in Timor. One of these flakes (679) has a known history of usage in this fashion up until the time it was obtained by Ellen. On most of these pieces the primary flake surfaces show a greater degree of patination than the edge flakes, which have clearly been removed subsequent to the production of the original flake.

7, 8, 10. OTHER BIFACIALLY BATTERED PIECES

There are some flakes and broken pieces of chert which seem at first glance too small to have been strike-a-lights, or have bifacial battering at one or both narrow ends and which resemble fabricators (*outils écaillés*) or small bipolar cores, struck with a hard hammer while resting directly on the stone anvil. Those in group 7 have been broken, those in group 8 (Fig. 1, 725) are battered around almost the entire margin, while group 10 comprises irregular lumps of chert worked at one end only. Nevertheless, Ellen saw flakes of this size used as strike-a-lights, and it is possible that some of the edge battering described here may have been due to such use.

9, 11, 12. UNUSED FLAKES, PSEUDO-FLAKES AND NATURALLY BROKEN PIECES

Group 9 consists of twenty-eight purposefully struck flakes (Fig. 1, 662, 687, 717) on which no traces of secondary working or use could be recognized even under a binocular microscope ($\times 8.5$). Groups 11 and 12 include only naturally broken pieces, pseudo-flakes, and broken flakes which were not purposefully struck. No traces of use or secondary working could be recognized, and these groups include most of the pieces showing thermal fractures.

13. GLASS

The Nuaulu have a term for glass strike-a-lights (*kinonote botoni*), and this piece of clear bottle glass was regarded by Ellen's informant as one. However, it cannot have been used more than once or twice, if at all, as the edges are rather fresh and sharp.

Although this is a small and archaeologically unsystematic collection, some idea of flake size is given by the figures in Table 4 based on measurements to 1 mm of length (at right angles to the striking platform), breadth, and thickness. In view of the way in which the collection was assembled it is probable that the sample exhibits

TABLE 4. FLAKE SIZES

	LENGTH	BREADTH	THICKNESS
Range	11-41	10-33	1-9
\bar{x}	19.3	16.6	5.2

NOTE: Flake size in mm. N = 34 complete flakes.

a bias in favor of larger pieces, so that it can be clearly seen that this is a small flake industry more comparable with those from the cave deposits in Java, Sulawesi, and Timor than with the archaic traditions from the Pleistocene gravel beds. Patterns of primary and secondary flaking reinforce this resemblance.

One interesting problem is the extent to which the battering on some of the flaked pieces (those in groups 6, 7, 8 and 10) is really a result of their use as strike-a-lights. One (762) of the four pieces (674, 679, 681, 762) known to have been used in this way exhibits none of the distinctive bifacial edge battering which has been observed on specimens from Timor (where the manner of their use is similar to that on Seram), and was put into group 12 by Glover. Two others (674 and 679) are clearly ancient cores with some recent battering on the edges. Many of the supposed *kinonote* collected by the Nuauulu for Ellen do not appear to have been used regularly as strike-a-lights, and they include several retouched pieces and many flakes (group 5) which show clear signs of use from other tasks. Others, including many with no known history of such use, display this strike-a-light wear pattern pronouncedly (e.g., Fig. 1 and Pl. I, 191) and can readily be distinguished from that produced by more conventional archaeological usages. Also, of the other possible strike-a-lights in groups 6, 7 and 8, two-thirds were deliberately struck flakes, and the rest naturally broken pieces. Our sample is too small to show that the Nuauulu deliberately sought out ancient flakes for use as *kinonote*; indeed, it is difficult to see what advantages they would have over merely broken pieces of chert. But the scarcity of naturally occurring chert in coastal Seram and the high proportion of reused flakes leads us to the conclusion that such material was readily available around Ruhewa only from older, archaeological deposits.

The picture that emerges is this. We have here for south Seram evidence of a small flake industry with broad affinities to prehistoric industries elsewhere in Indonesia and in the Philippines. However, on the basis of ethnographic information and analogy it is clear that some of this same material has been reused as strike-a-lights, and still is so used. As an example of archaic implements being reused for a quite different purpose than the one for which they appear to have been intended, this is hardly likely to be an isolated example. Archaeologists have never been short of possible tool categories to explain the function of stone artifacts, but it appears that use for fire-making has rarely been seriously considered (but see Harrison 1954: 218, Fig. 137a). And yet ethnographic and historical evidence for this use is not lacking, and ought to be considered when edge-damage patterns of stone tools are being examined.

This essentially ethnographic collection has brought to notice a previously unrecognized "prehistoric" flaked stone tradition in Seram and has shown that although the existing Nuauulu villages are only recently founded, occupation of these localities is more ancient. Archaeological investigation of the sites may help to elucidate the changing economic and settlement patterns in Seram.

ACKNOWLEDGMENTS

Roy Ellen carried out fieldwork for eighteen months between 1969 and 1971 (see Ellen 1973) and for two months in 1973. On both occasions research was made possible through the kind cooperation of Lembaga Ilmu Pengetahuan Indonesia

(the Indonesian Institute of Sciences). Funds were provided through the assistance of the Social Science Research Council, the London-Cornell Project for East and South-East Asia, the Central Research Fund of the University of London, and a Hayter Travel Award. We would like to thank Dr. R. W. Sanderson of the Petrographical Department of the Institute of Geological Sciences, London, for the identification of specimens of Seramese minerals collected in the field.

REFERENCES

- ALLEN, J.
1972 The first decade in New Guinea archaeology. *A* 46: 180-190.
- CRAIG, B.
1967 Making fire by percussion in the Telefomin area, New Guinea. *Mankind* 6: 434-435.
- DANIEL, G.
1962 *The Idea of Prehistory*. London: C. A. Watts.
- ELLEN, R. F.
1973 Nuaulu settlement and ecology: an approach to the environmental relations of an eastern Indonesian community. Ph.D. thesis, University of London.
- GERMERAAD, J. H.
1946 Geology of central Seram. In L. Rutten and W. Holz, *Geological, Petrographical and Palaeontological Results of Explorations, carried out from September 1917 till June 1919 in the Island of Seram*. Third series: Geology, no. 2. Amsterdam: J. H. de Bussy.
- GLOVER, I. C.
1973 Late stone age traditions in south-east Asia. In *South Asian Archaeology*, ed. by N. Hammond, pp. 51-65. London: Duckworth.
- HARRISON, H. S.
1954 Fire-making, fuel and lighting. In *A History of Technology*, ed. by C. Singer, E. J. Holmyard, and A. R. Hall, pp. 216-237. Oxford: Clarendon Press.
- HEEKEREN, H. R. VAN
1972 *The Stone Age of Indonesia*. 2nd ed. The Hague: Martinus Nijhoff.
- HEINE-GELDERN, R. VON
1945 Prehistoric research in the Netherlands Indies. In *Science and Scientists in the Netherlands Indies, Surinam and Curacao*, ed. by P. Honig and F. Verdoorn, pp. 129-167. New York: Board for the Netherlands Indies, Surinam and Curacao.
- HELD, G. J.
1957 *The Papuas of Waropen*. The Hague: Martinus Nijhoff.
- RUMPHIUS, G. E.
1741 *D'Amboinische rariteitkamer*. Amsterdam: Jan Roman de Jonge.
- WALLACE, A. R.
1962 [1869] *The Malay Archipelago*. New York: Dover.

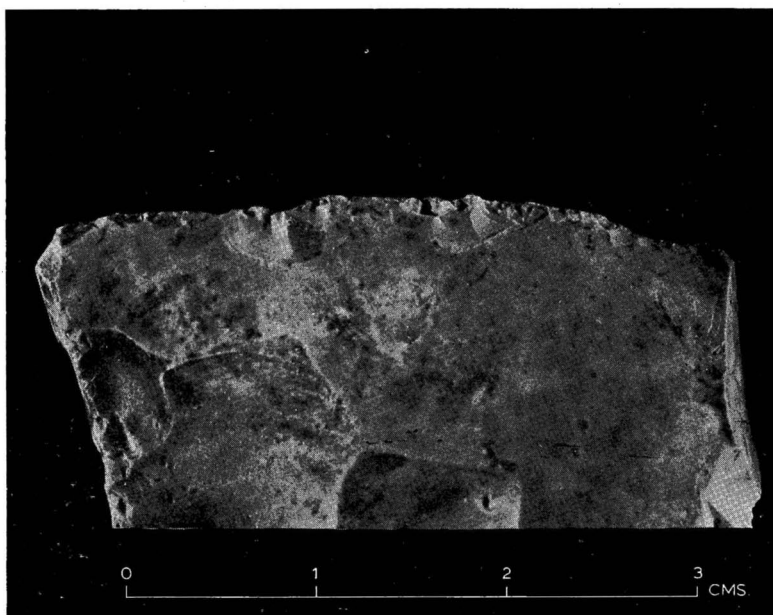


Plate I Fractures believed to have been caused by use as a strike-a-light on the lateral margin of a 'prehistoric' chert blade (191) from Ruhuwa, Seram. The edge wear occurs equally on both ventral (shown here) and dorsal faces with striking angles between about 45° and 60° to the flake surface. The small edge scars generally show less patination than the primary flake surfaces.